The Case Against Biodefense

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Introduction

The views expressed in this presentation are those of the presenter, and do not reflect the official policy or position of the US Air Force, Dept of Defense, or the US government.

1. **The threat in perspective**
   - possible vs. probable

2. **What about biodetection?**
   - The problem with air samplers

3. **Recommendations**
   - " A Hot Idea"

Possible
(maybe)
vs.
Probable
(expect it)

THE POSSIBLE THREAT

CDC 'Category A' Diseases

Disease	Cause	Vaccine	Treatment
Anthrax	Bacteria	YES	YES
Botulism	Toxin	NO	YES
Plague	Bacteria	Not Available	YES
Smallpox	Virus	YES	NO
Tularemia	Bacteria	Not Available	YES
Viral Hemorrhagic Fevers	Virus	NO	NO

“Deadliest” Bioterrorist Attacks

1984: Dalles, OR; Rajneeshee Salmonella food poisoning
- 750 ill; 60 visited ER; 21 hospitalized; 0 deaths

1991: Minnesota; Patriot’s Council ricin toxin
- Plot undermined; 0 ill; 0 hospitalized; 0 deaths

1995: Arkansas; ricin toxin
- Plot undermined; 0 ill; 0 hospitalized; 0 deaths

1995: Ohio; plague
- Plot undermined; 0 ill; 0 hospitalized; 0 deaths

1996: Dallas, TX; shigella
- Poisoned donuts; 13 ill; 13 hospitalized; 0 deaths

1998: Las Vegas, NV; anthrax
- Plot undermined; 0 ill; 0 hospitalized; 0 deaths

2000: Irvine, CA; many agents
- Plot undermined; 0 ill; 0 hospitalized; 0 deaths

2001: FL, NY, NJ, DC, CT; anthrax mailings
- ~Millions of doses mailed; 33,000 people on antibiotics; 22 cases; 5 deaths

THE PROBABLE THREAT!

Average Annual Deaths (U.S.)

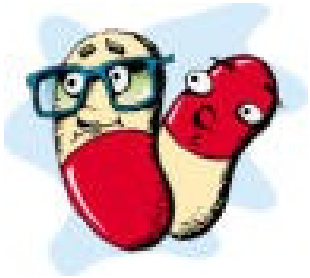
Hosp Infections	**90,000**
Flu	**36,000**
AIDS	**15,000**
Hepatitis B	**5,000**

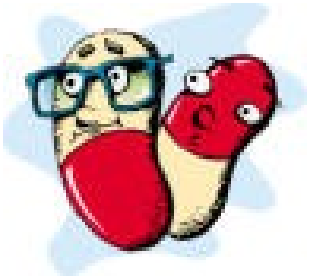
Who's Behind the Threat?

Mother Nature

- 1976 – Legionnaire's
- 1981 – HIV/AIDS
- 1999 – West Nile Virus
- 2003 – SARS

The Case For Biosecurity

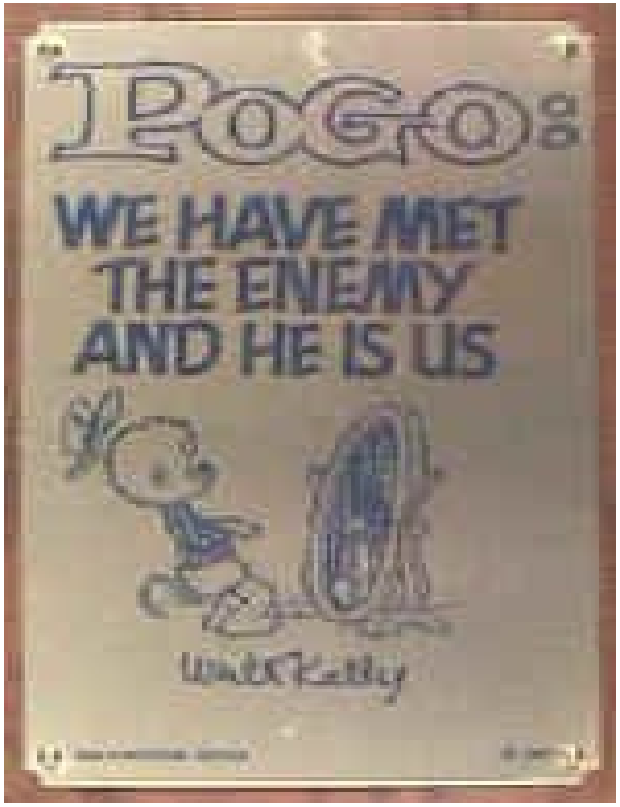




Biosecurity: diverse and far-reaching protectio
from risks posed by organisms to the economy,
environment, and people's health, through exclus
eradication, control, and education

Who's Behind the Threat?

We are.



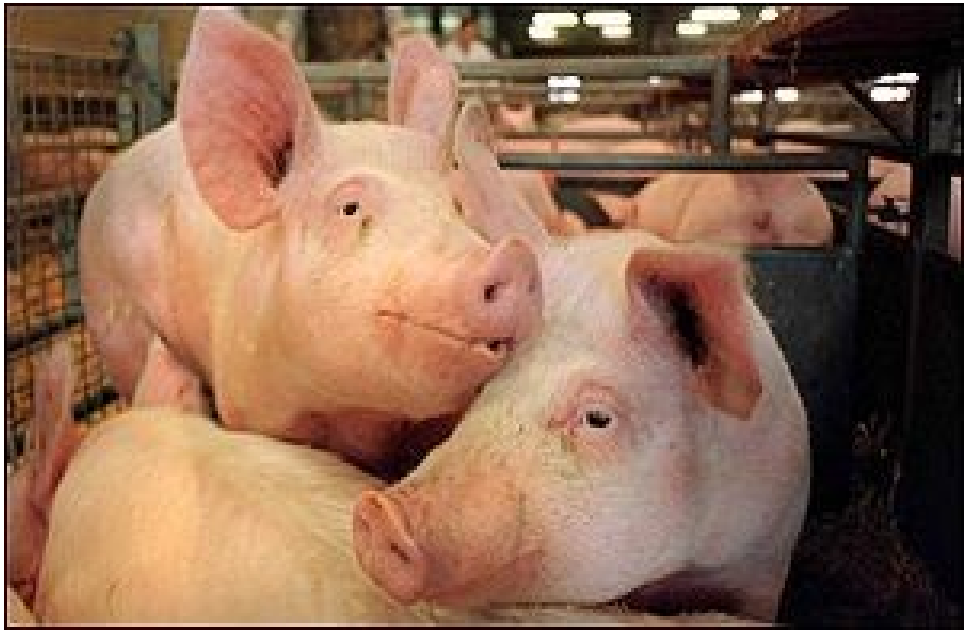
Dr. Kim Thompson, Harvard School of Public Health:

"Antibiotic resistant germs and bacteria are costing the United States roughly $30 billion each

Antibiotic Misuse

Agricultural Antibiotics

- **70% of US antibiotics are fed to *healthy* pigs, cows, chickens (promotes growth and prevents disease)**
- **Total nontherapeutic antibiotic use in animals:**
  1980s – 16.1 million lbs
  Today – 24.6 million lbs



Some Hope:

- **1998 – European Union bans nontherapeutic use in livestock**
- ***Applying pressure* – American Medical Association, American Public Health Association, CDC, World Health Organization**

Antibiotic Misuse

1954: 2M lbs. antibiotics in US

2004: >50 M lbs. antibiotics in US

CDC:

Up to half the 100 million courses of antibiotics prescribed annually in the US are unnecessary

- **90,000 deaths per year due to hospital infections**
- **>70% of the bacteria that cause these infections are antibiotic resistant**
- **Vancomycin—the US 'drug of last resort'—readily prescribed**
- **US: 6% E. coli cases resistant to Ciproflaxacin;**

We create the threat

1. <u>Bird markets</u> - Hong Kong, Bangkok, Java, NYC

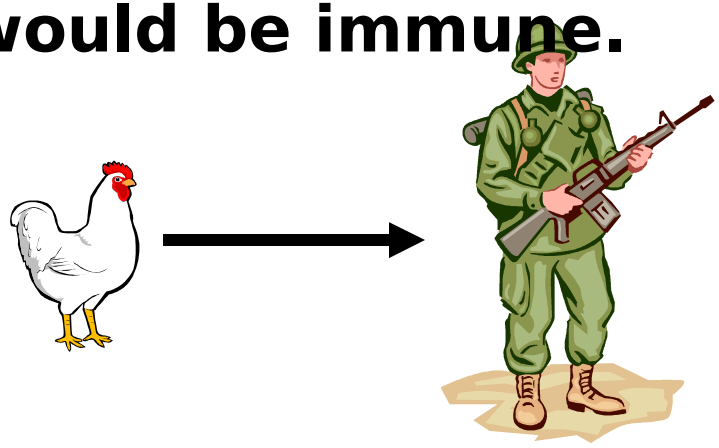
   - “ideal breeding ground” for influenza

   - 1.5+ M birds of 276 species sold each yr in 1 market)

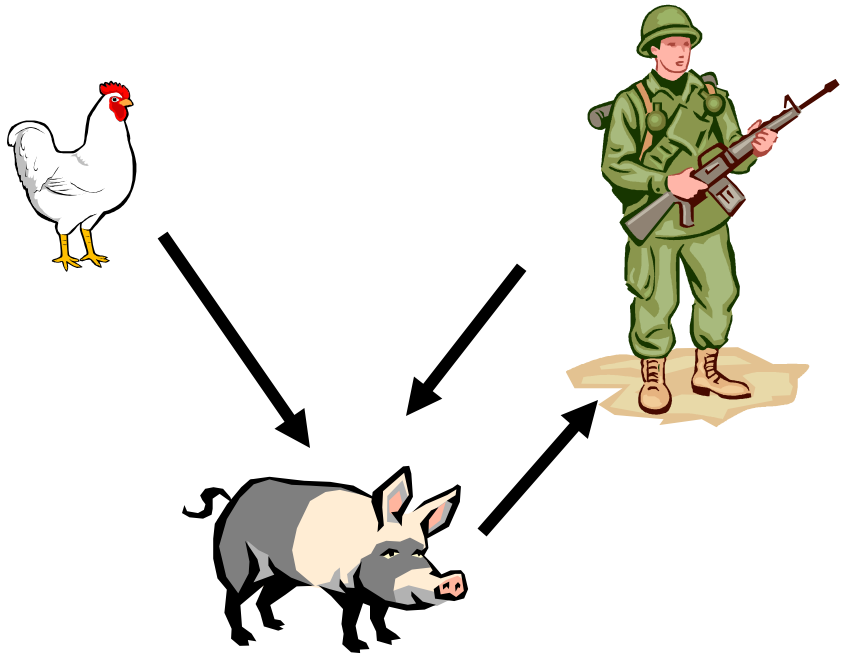
2. <u>Agricultural practices</u> – raising poultry and pigs

Creating New Strains of Flu

If bird flu and human flu viruses exchange genes, a new virus could result. Few humans would be immune.



A person with human flu contracts bird flu from infected bird feces. The two viruses swap genes, creating a virus that can be spread human-to-human.



Pigs can contract both bird and human viruses. The two viruses mix to create a virus that can be passed to humans.

Avian Influenza (Bird Flu)

Cases in 8 Asian countries

(Cambodia, China, Indonesia, Japan, Laos, South Korea, Thailand and Vietnam)

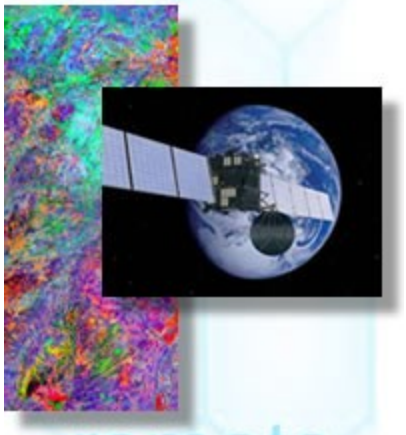
- **No human-to-human transmissions yet**
- **100M+ chickens died or slaughtered**
- **High fatality rate, 32/44 = 75% (SARS 10%**
- **Resistant to 2 of the 4 antiviral drugs**
- **30 Bengal tigers died from eating raw chic**

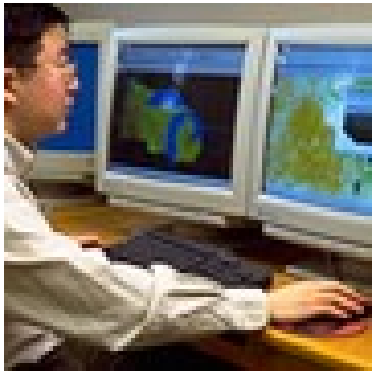
Containing the Threat

FOCUS on the PROBABLE,

NOT just the POSSIBLE

Remote Sensing and GIS





- Remote Sensing and Geographic Information Systems (GIS) technologies can be used to describe and model patterns and prevalence of disease

-Remote detection of diseases in SOCOM operating areas is crucial to mission success

- Environmental change and patterns of disease can be sensed remotely with instruments on aircraft and satellites

- These environmental parameters can be modeled spatially

- Use RS/GIS data to determine biological

What about biodetection?

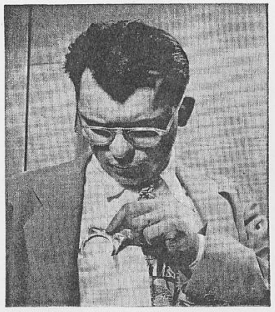
Life Magazine, "What To Do About Germ Warfare" August 13, 1951

BIOLOGICAL WARFARE CONTINUED

SAMPLING AIR 20 feet above Savannah's Broughton Street, two U.S. Public Health scientists remove flasks filled with germ-trapping broth from experimental sampler atop a store marquee. Sampler has 12 flasks, and air is sucked automatically into them one at a time, 20 minutes each, thus revealing any change in bacteria count during four-hour period. In actual use any unusual rise in the total number of germs would suggest danger even before organisms were identified. The new membrane filter (*below*) may be incorporated into this air sampler or used with it to make up the best germ-detecting and identifying system yet.

TRAPPING BACTERIA with newly developed filter (inside metal funnel), a bacteriologist sucks on tube to create a partial vacuum which pulls sample of water through filter and into conical flask below.

REMOVING FILTER from the funnel, tweezers are clamped on edge so bacteria trapped in middle will be undisturbed. Next, the filter is laid on pad filled with nutrient media, then wrapped up in Pliofilm.



INCUBATING BACTERIA with body heat, a scientist puts Pliofilm-wrapped filter and pad in pocket. Bacteria start growing while he goes on about work, greatly speeding their identification (*opposite page*).

BioWatch Collection System

- $60 M bio-collector networ
- $118 M proposed for 2005
- 31 cities, ~$2 M per city
- 10-15 sites per city
- Screens for < 12 bugs

- Claim - Attack known w/in 12 hours
- Claim - Accounts for ½ the US pop.

Limitations of BioWatch Collectors

- Collectors, not sensors
- Vacuum small amounts of air (approx. one large room per hour)
- Detects only large aerosol cloud
- Lab analysis takes 36-48hrs
- Each sample costs ~

JASON concluded:

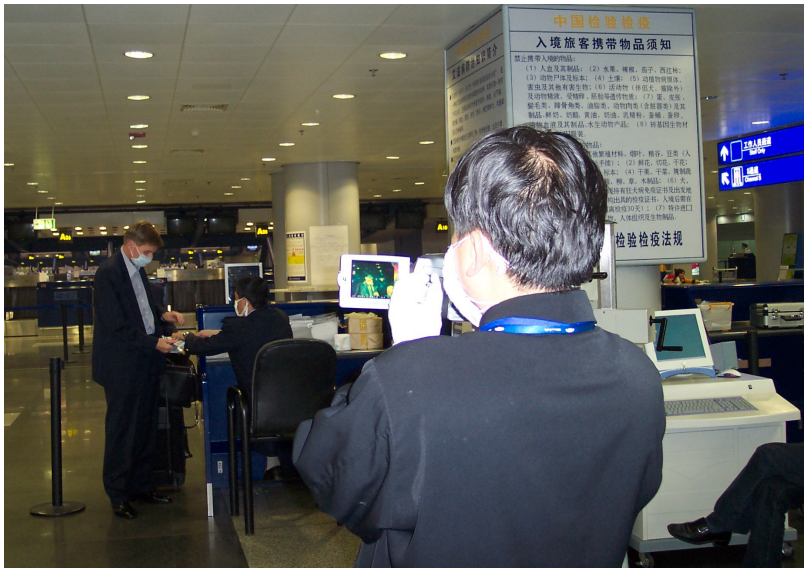
"It is not realistic to undertake a nationwide, blanket deployment of biosensors…

"Instead, biosensors should be deployed in a focused manner as one component of a broader biodetection architecture that also includes intelligence gathering and medical surveillance."[1]

"Medical surveillance relies on the <u>American people</u> as a network of <u>288 million mobile sensors</u>…"[2]

[1] JASON, "Biodetection Architectures," February 2003, 35.
[2] Ibid., 1.

Thermal Imaging



Body temperature - efficient and economical method to monitor vital signs

Used at airports during 03 SARS epidemic

“A Hot Idea”

Metropolitan Washington, DC workforce

- 150 parking enforcement workers
- 12,110 police and sheriff’s patrol officers
- 4,900 firefighters
- 5,940 mail carriers
- 400 EMS workers

TOTAL POPULATION: 23,500 people

In one hour, each member samples 480 liters of air.[3] Per hour, the entire workforce samples 11,280,000 liters.

- **Roughly equivalent to 66 high-volume samplers.[4]**

[3] Assume an average breathing rate of .5 liters per breath, with 16 breaths per minute.

[4] Assume a “very-high-volume” capacity for the BioWatch collectors at 100 cubic feet of air per

RECOMMENDATIONS

1. In investing, program development, training – always think PROBABLE before POSSIBLE
2. Be an advocate for decreasing misuse of antibiotics --- if you have the flu don't take antibiotics
3. Teach Special Operations soldiers to stay away from large markets, especially bird markets
4. Avoid eating eggs or chicken in Asian countries, or thoroughly cook them
5. Wash your hands frequently
6. Use MEDFLAGS as opportunities to discuss issues such as bird flu, dangers of raising pigs and poultry together, antibiotic misuse
7. Consider using personnel as mobile samplers

Questions?

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